

1. A blasting system for selectively detonating a plurality of charges located in a plurality of boreholes at a blasting site, comprising:
  - a blasting controller;
  - a plurality of detonators operatively connected to the blasting controller, each of the detonators associated with and adapted to discharge a selected number of charges, the detonators located in the boreholes;
  - a handheld programming unit adapted to communicate blasting information to the detonators, to store the communicated blasting information and to transfer the stored blasting information to the blasting controller; and
  - a positional device incorporated with the handheld unit and adapted to cooperate with the handheld unit to automatically determine blasting information for communication to at least one detonator based on at least one of the following:
    - a) movement of the device to said at least one detonator; and
    - b) positional data associated with the location of said at least one detonator, whereby the use of automatically determined blasting information facilitates accurate communication of the blasting information to said at least one detonator and to the blasting controller, to help achieve a desired blasting sequence.
2. The blasting system of claim 1 wherein the positional device further comprises at least one of a GPS receiver and an accelerometer.
3. The blasting system of claim 1 wherein for said at least one detonator the handheld programming unit and positional device automatically determine a delay time for downloading to the detonator.

4. The blasting system of claim 1 wherein the positional device is integrally incorporated with the handheld programming unit.

5. The blasting system of claim 4 wherein the handheld programming unit further comprises a display for showing at least one of the following:

a representation of the locations of the detonators, a delay time, an identifier and coordinates related to the actual position of the unit.

6. The blasting system of claim 5 wherein the handheld programming unit further comprises:

means for inputting selected data to the unit, to assist in correlating an identifier and a delay time for each detonator.

7. The blasting system of claim 1 and further comprising:

means for signal communication between the handheld programming unit and each of the detonators, whereby blasting information may be downloaded from the unit to the detonators.

8. The blasting system of claim 1 and further comprising:

a case for housing the blasting controller, the case including a cradle adapted to receive the handheld programming unit so as to place the unit and the controller in operative communication, whereby blasting information for the detonators may be uploaded to the blasting controller.

9. The blasting system of claim 1 wherein the blasting controller further comprises:
- a display for showing the locations of the detonators; and
  - at least one input device for calling up at the display, blasting information associated with a selected detonator.

10. A method of preparing a first detonator for use in a blasting sequence comprising:  
moving a programming unit to the location of the first detonator, the programming unit adapted to download blasting information to the first detonator;  
determining blasting information for the first detonator according to the moving of the programming unit to the first detonator; and  
downloading the determined blasting information to the first detonator.
11. The method of claim 10 wherein said determining further comprises:  
determining a delay time and an identifier for the first detonator.
12. The method of claim 10 wherein said determining further comprises:  
incrementing a predetermined delay time by a desired amount according to a direction of movement of the programming unit to the first detonator and a distance traveled by the programming unit to the first detonator, as measured by the programming unit.
13. The method of claim 11 wherein said determining further comprises:  
identifying the delay time based on the actual location of the first detonator, as measured by the programming unit while at the first detonator.
14. The method of claim 10 and further comprising:  
checking the first detonator to verify that correct blasting information has been downloaded thereto, said checking occurring via reference to the actual location of the first detonator.

15. The method of claim 14 wherein said checking occurs from a site located remotely from the first detonator.

16. The method of claim 10 wherein said moving occurs via actual movement, at the blasting site, of at least one technician carrying the programming unit.

17. The method of claim 10 further comprising:

communicating the blasting information for the first detonator to a blasting controller;

and

thereafter repeating said moving, said determining, said downloading, and said communicating for a plurality of detonators.

18. A method for discharging a plurality of charges in a desired blasting pattern at a blasting site, the charges located in boreholes at the blasting site and operatively connected to a detonator associated therewith, comprising:

associating an identifier with each of the detonators;

locating and moving a programmable unit to each of detonators, until all of the detonators have been located and moved to, and while at each detonator:

a) determining a desired delay time; and

b) correlating the determined delay time with the respective identifier for the detonator, the determining occurring automatically via a position determining device associated with the programmable unit and based on at least one of the following: the actual location of the detonator as determined by the position determining device, and movement of the position determining device to the actual location of the detonator;

downloading, at each detonator, the determined delay time and the respective identifier correlated therewith;

communicating from the handheld unit to a blasting controller, the downloaded delay times and the identifiers for the detonators;

transmitting, from the blasting controller to each of the detonators, a firing signal thereby to cause each of the detonators to detonate after the lapse of the respective stored delay times to achieve a desired blasting pattern.

19. The method of claim 18 further comprising:

placing the charges in the boreholes in a desired manner at the blasting site;

associating at least one detonator with each of the charges; and

operatively connecting the detonators to the blasting controller via electrical cables.

20. The method of claim 18 further comprising:  
verifying the operability of the detonators prior to said transmitting, said verifying occurring via the use of position information correlated to the locations of the detonators.
21. The method of claim 18 wherein said determining further comprises:  
at a first detonator, incrementing a predetermined delay time by a desired amount based on the distance and the direction moved to said first detonator.
22. The method of claim 18 wherein said communication occurs with the programmable unit residing in a cradle at the blasting controller.

23. A method for locating a first detonator of a plurality of detonators in a plurality of associated boreholes at a blasting site, the method comprising:

retrieving from a memory of a programming unit an identifier associated with a first detonator;

correlating said identifier to an expected location also retrieved from said memory;

receiving from said programming unit positional data indicative of an actual location of said programming unit;

determining directional data indicative of said actual location relative to said expected location; and

displaying said directional data to a technician.



24. A method for discharging a plurality of charges in a desired blasting pattern at a blasting site, the charges located in boreholes at the blasting site and operatively connected to a detonator associated therewith, comprising:

moving a programming unit to a location of a first detonator of a series of detonators to be programmed using a programming unit;

downloading a first delay time into said first detonator;

determining a second delay time using said first delay time; and

subsequently downloading said second delay time into a second detonator of said series of detonators to be programmed.

25. A program product comprising:

a program resident on a programming unit configured to download blasting information to a detonator located at a blasting site, wherein the program automatically determines at least some of the blasting information based on movement of the programming unit in a direction toward and a distance to the actual location of the detonator; and  
a signal bearing medium bearing the first program.

26. The program product of claim 25 wherein the signal bearing medium includes at least one of a recordable medium and a transmission-type medium.

27. A program product comprising:

a program resident on a programming unit configured to download blasting information to a detonator located at a blasting site, wherein the program automatically determines at least some of the blasting information according to a GPS reading taken at the actual location of the detonator; and

a signal bearing medium bearing the first program.

28. The program product of claim 27 wherein the signal bearing medium includes at least one of a recordable medium and a transmission-type medium.